LOCKHEED MARTIN

ORIGINAL

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11/16/2007

Risk Management Program Coordinator
Oil and Prevention Branch (3HS61)
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Attention: Michael Welsh, P.E.

Subject: Delivery of Photographs for "12th Street Dump site, Wilmington, DE,"
TS-PIC-20803581S

Dear Mr. Welsh:

Attached find one set of photographs with attached annotated overlays for the above mentioned project. An electronic draft version of the project text will be delivered late morning, Monday the 19th, via Email.

If you have any questions, please contact me at 897-3232

Very truly yours,

(b) (4)

Remote Sensing Support Services
Contract

cc: (b) (4)
RS835810

Figure 1. Local site location and photo figure coverage map, Wilmington South, DE-NJ (USGS, 1993). Approximate scale 1:24,000.

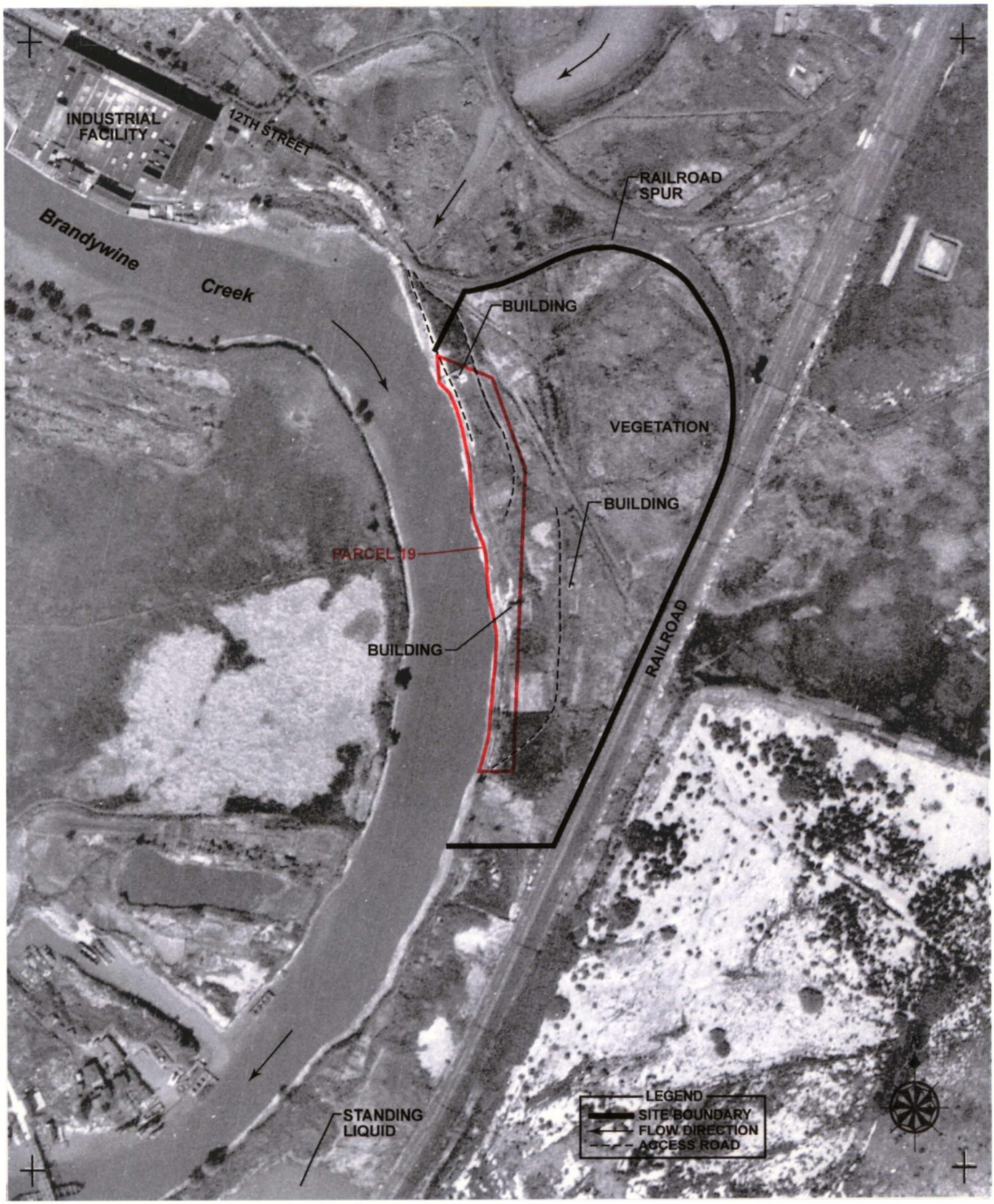

Figure 2. 12th Street Dump site, October 16, 1937. Approximate scale 1:4,300.

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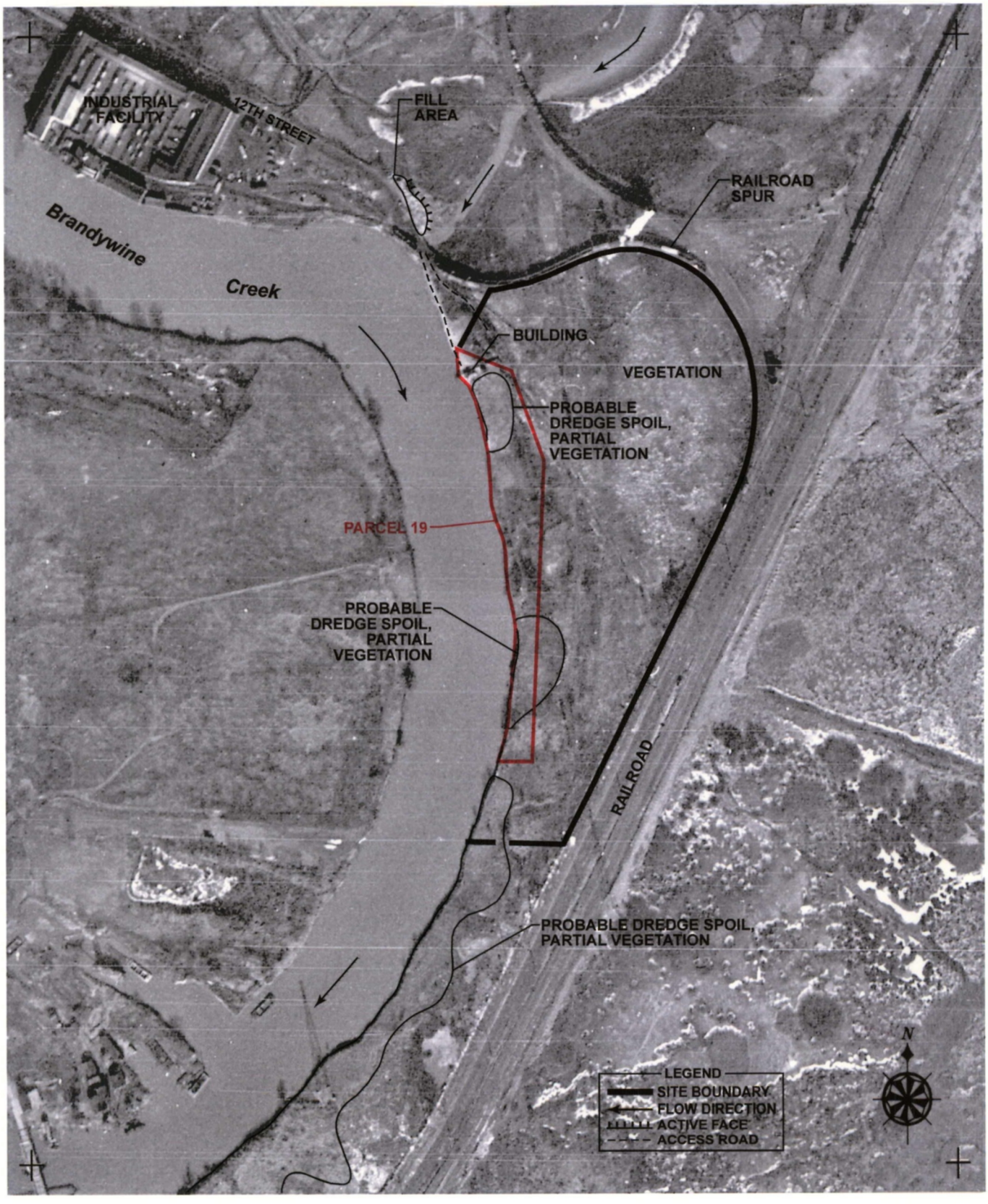

Figure 3. 12th Street Dump site, November 8, 1942. Approximate scale 1:4,300.

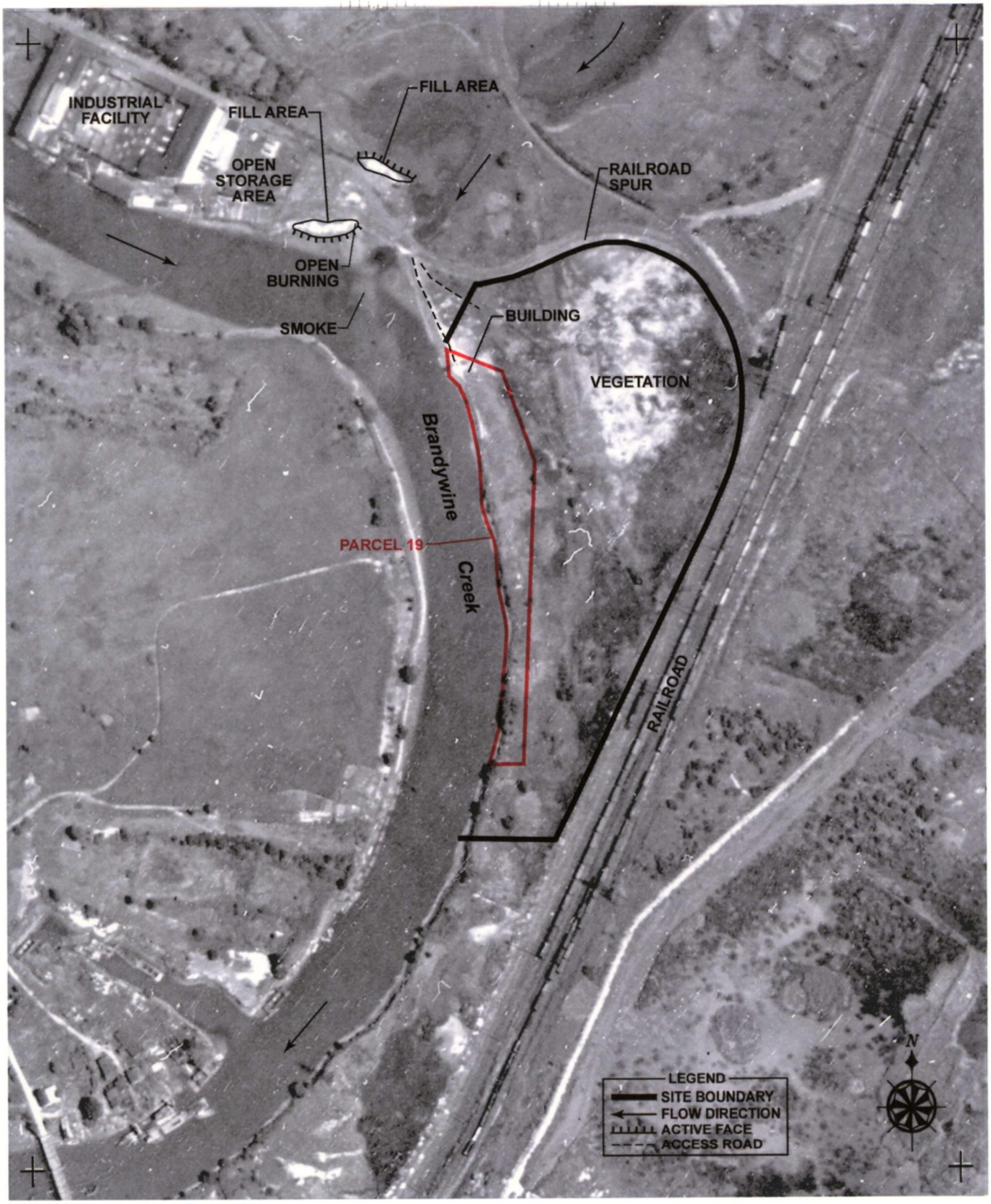

Figure 4. 12th Street Dump site, August 9, 1944. Approximate scale 1:4,300.

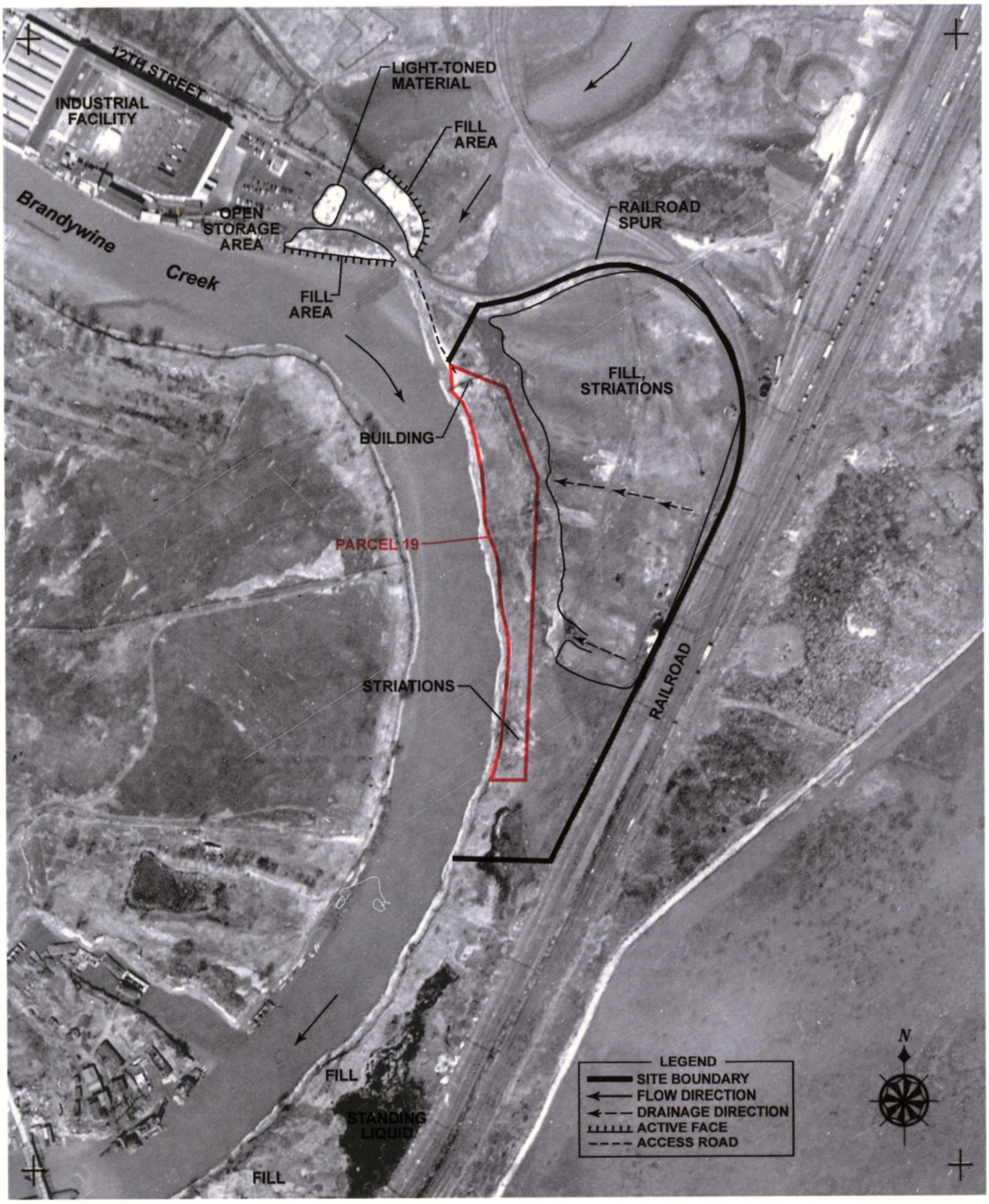

Figure 5. 12th Street Dump site, March 12, 1946. Approximate scale 1:4,300.

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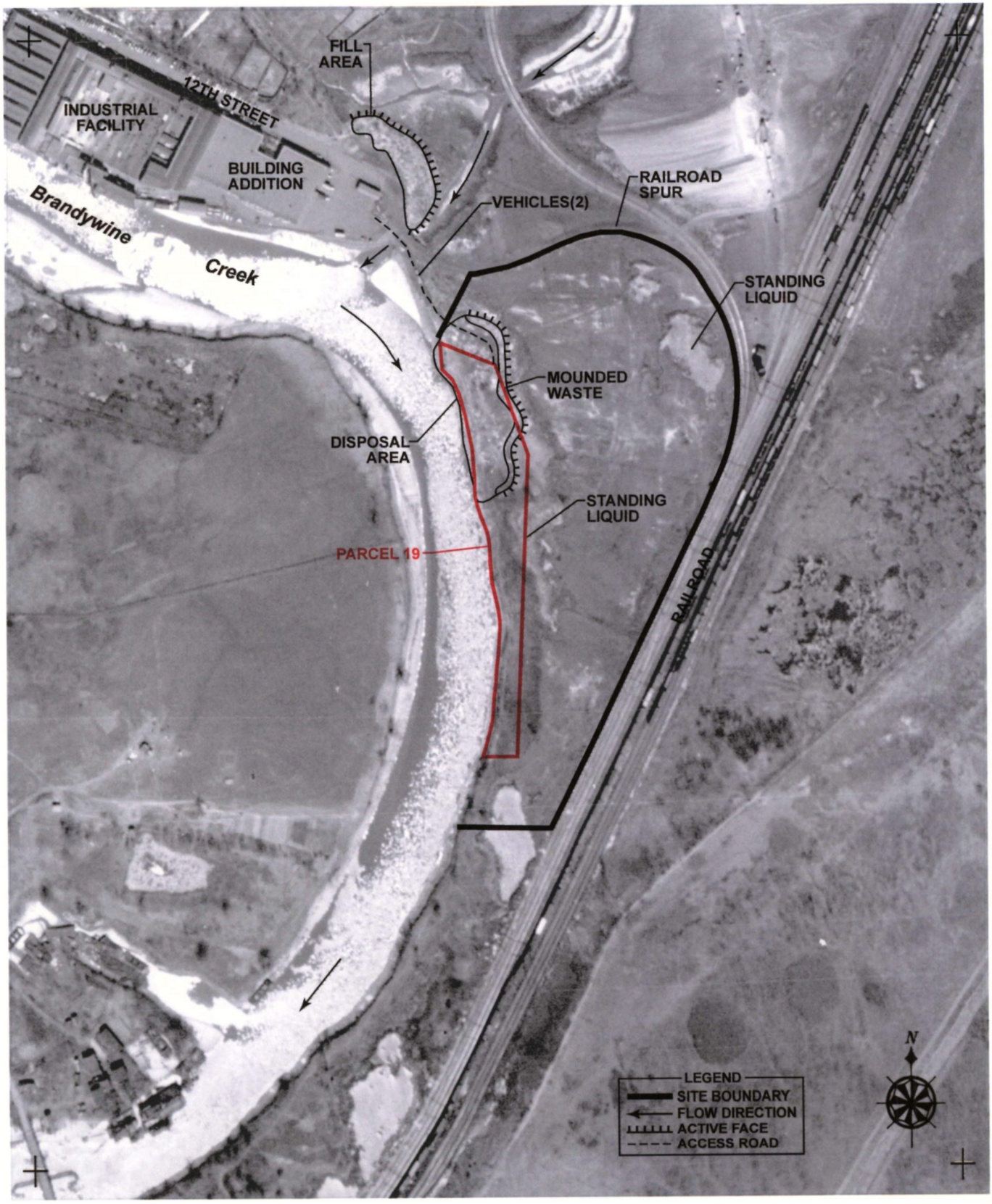

Figure 6. 12th Street Dump site, April 7, 1950. Approximate scale 1:4,300.

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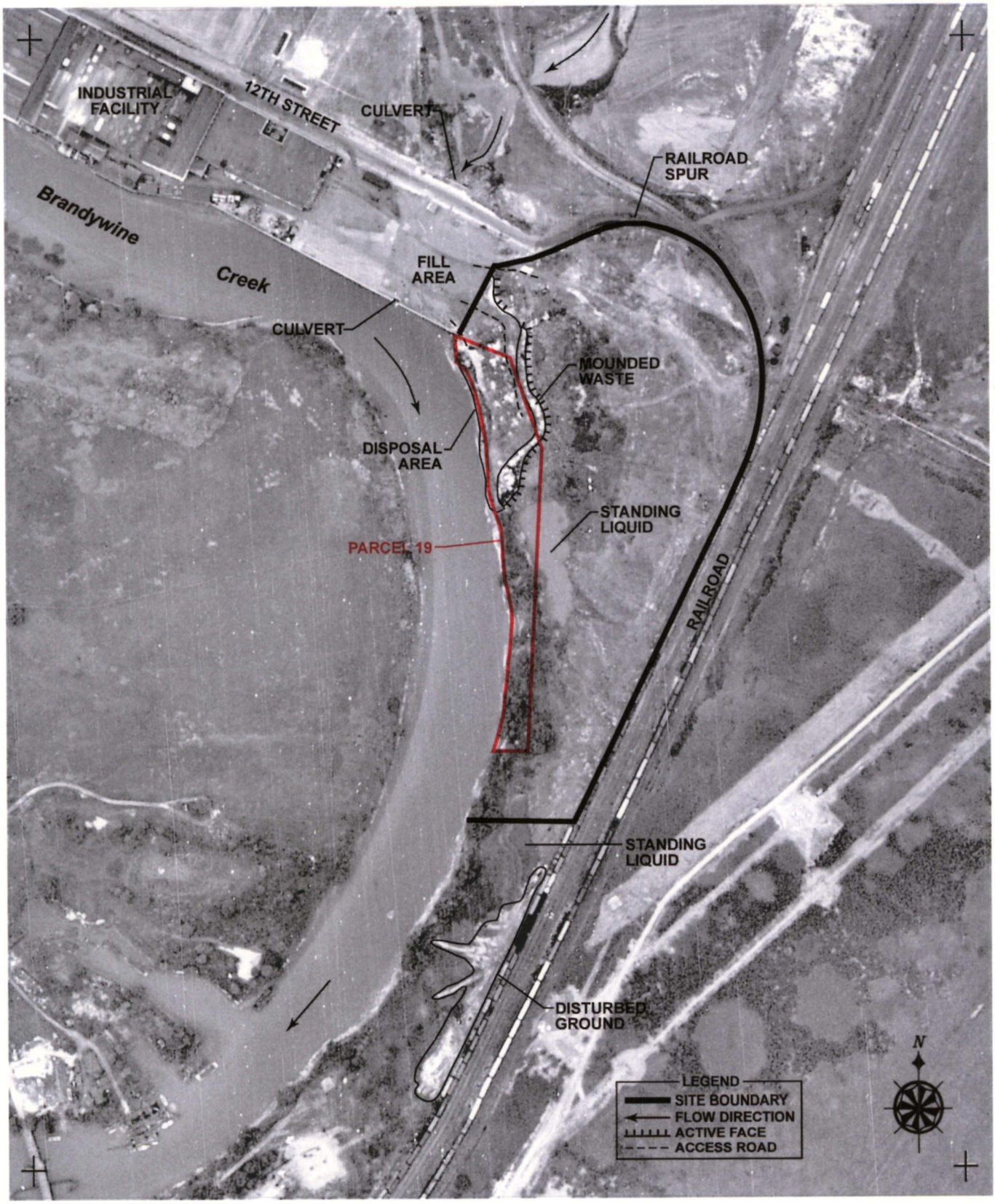

Figure 7. 12th Street Dump site, August 14, 1954. Approximate scale 1:4,300.

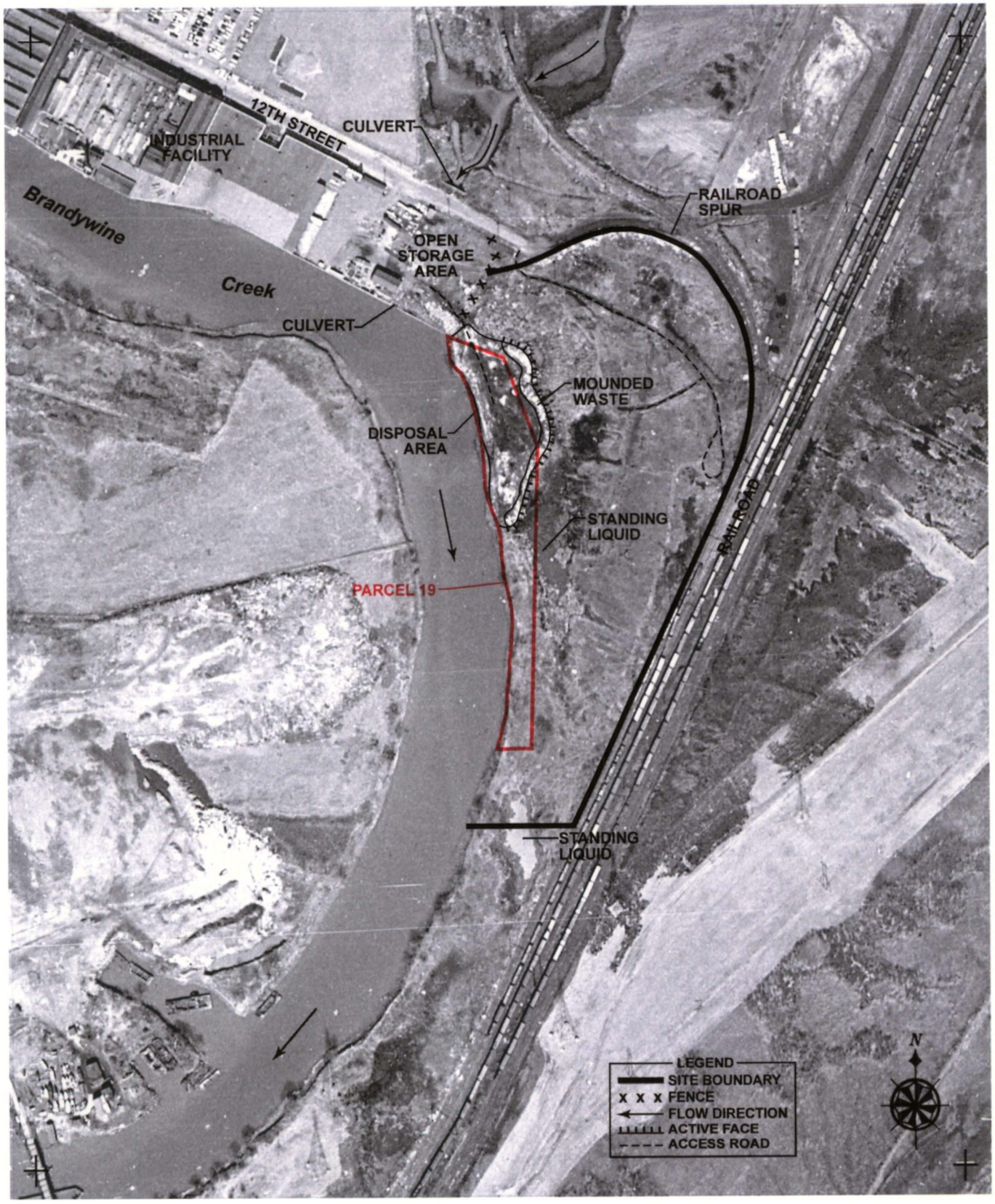

Figure 8. 12th Street Dump site, March 5, 1959. Approximate scale 1:4,300.

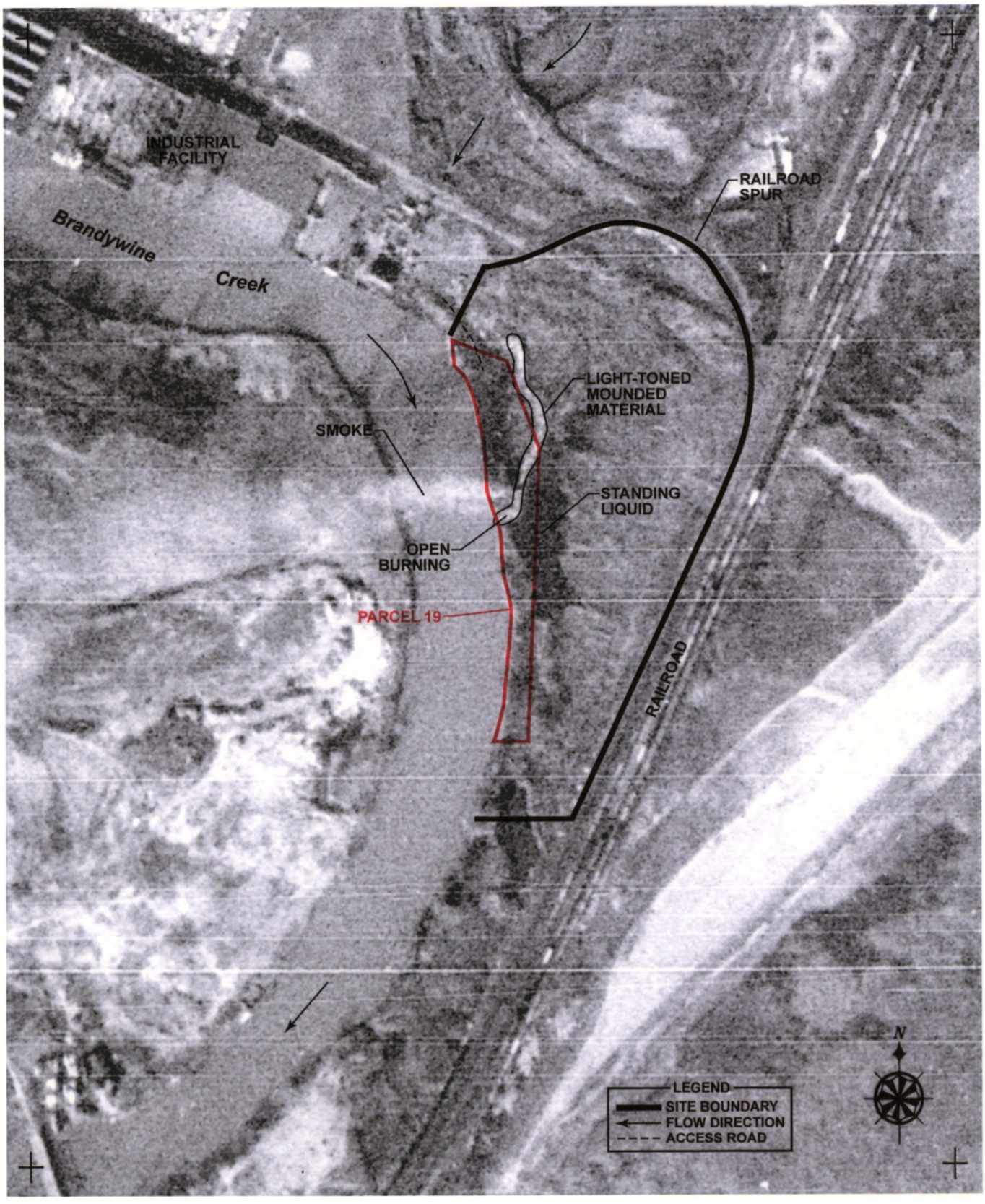

Figure 9. 12th Street Dump site, December 4, 1959. Approximate scale 1:4,300.

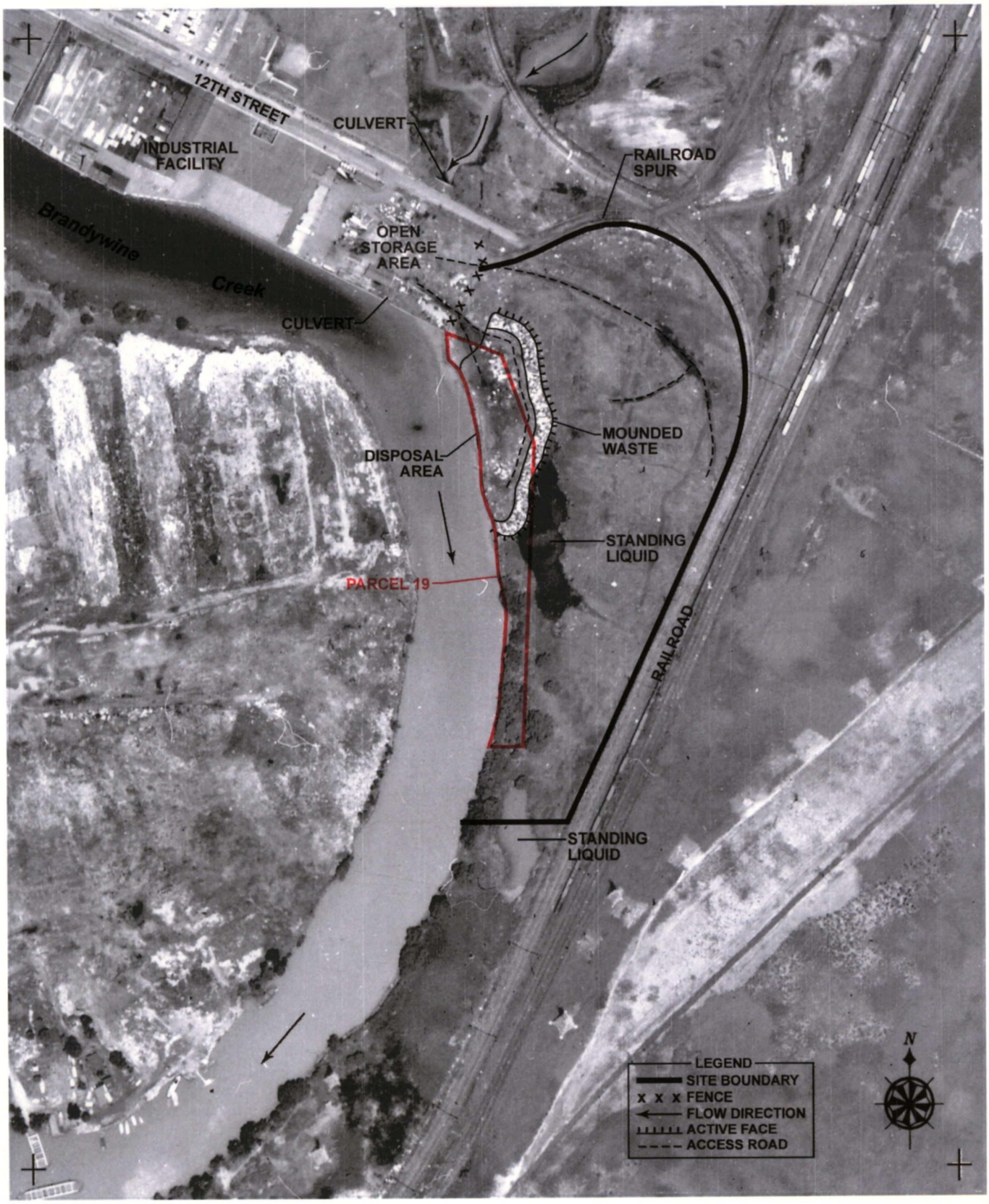

Figure 10. 12th Street Dump site, June 16, 1962. Approximate scale 1:4,300.

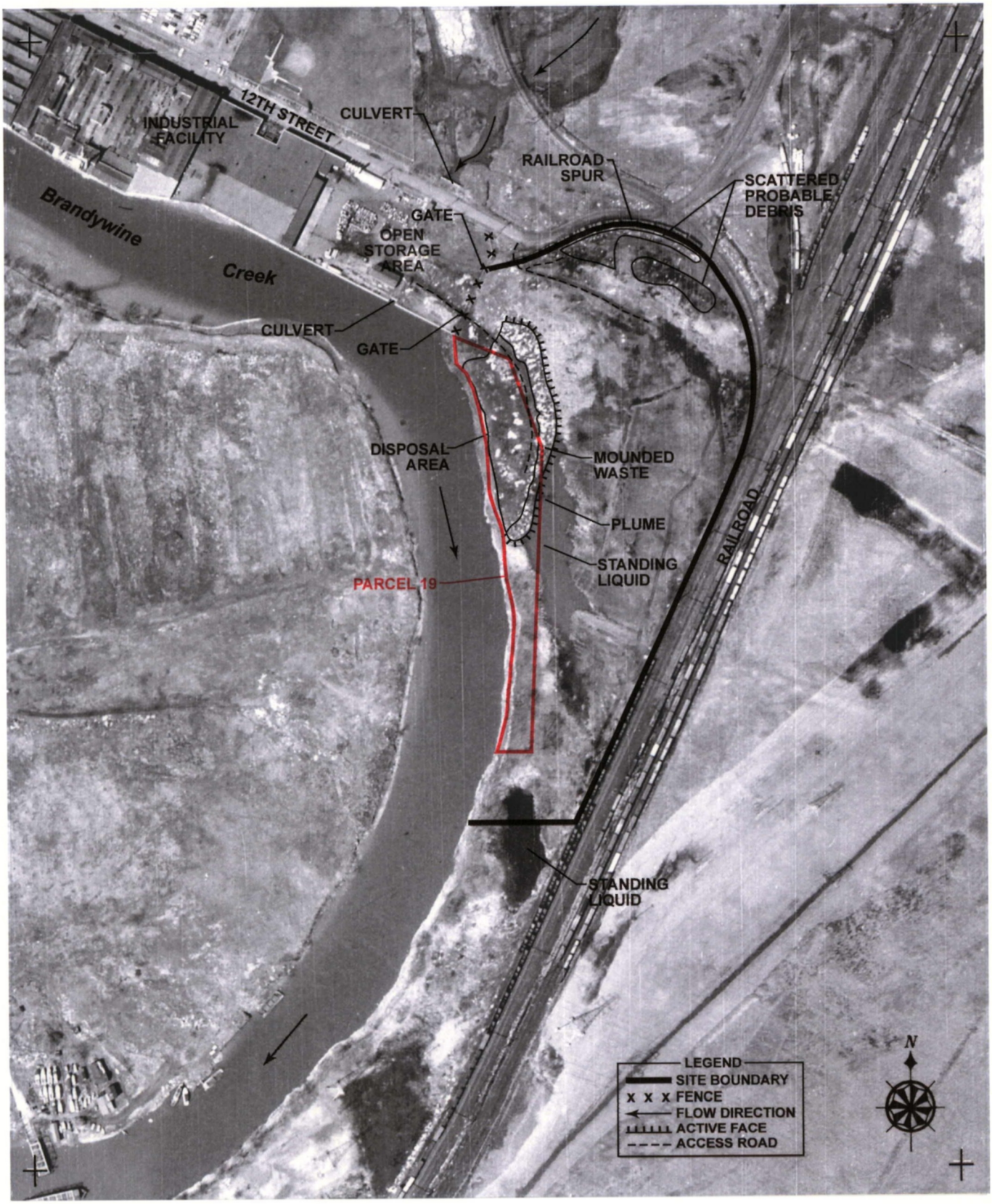

Figure 11. 12th Street Dump site, April 4, 1964. Approximate scale 1:4,300.

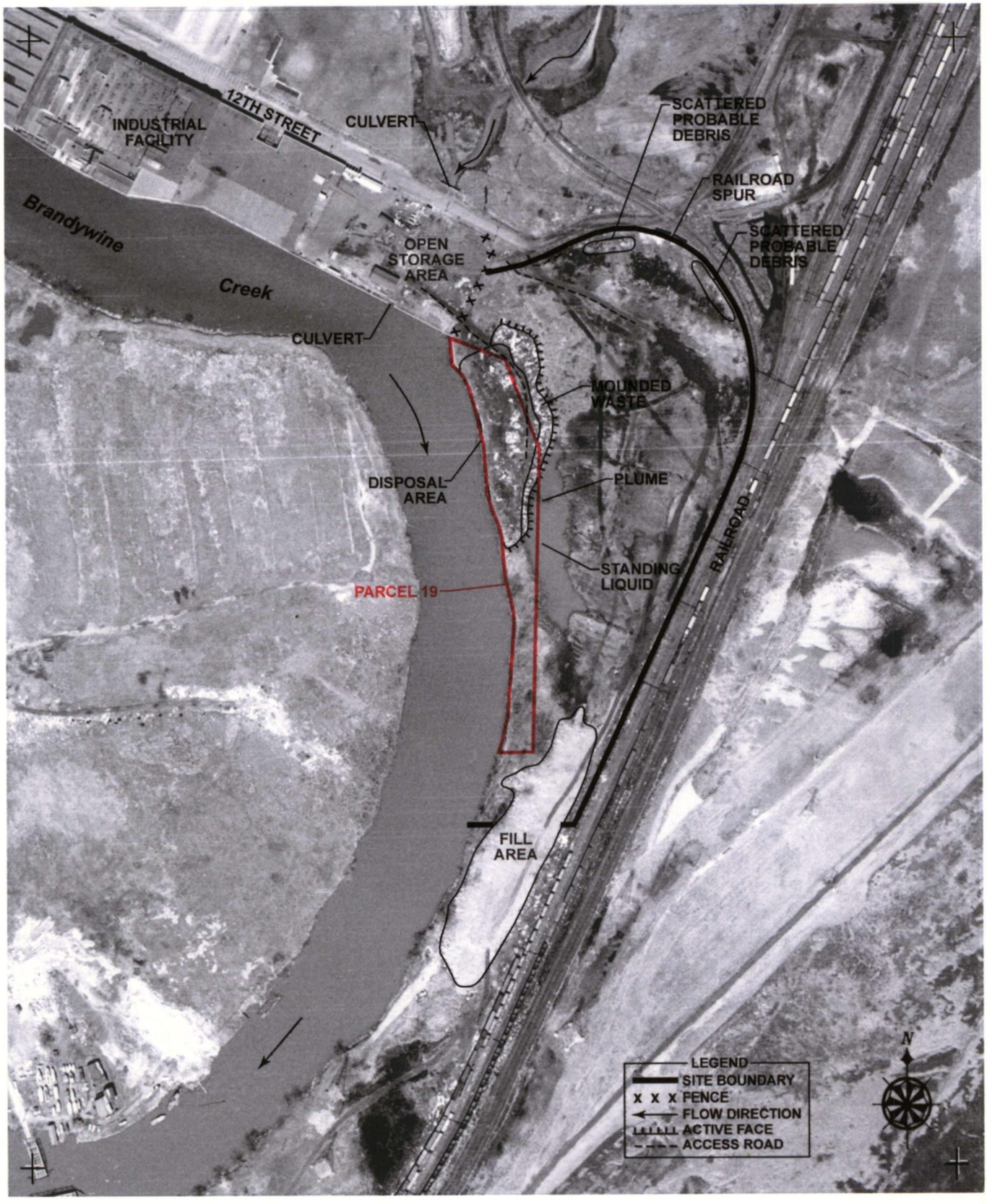

Figure 12. 12th Street Dump site, April 4, 1965. Approximate scale 1:4,300.

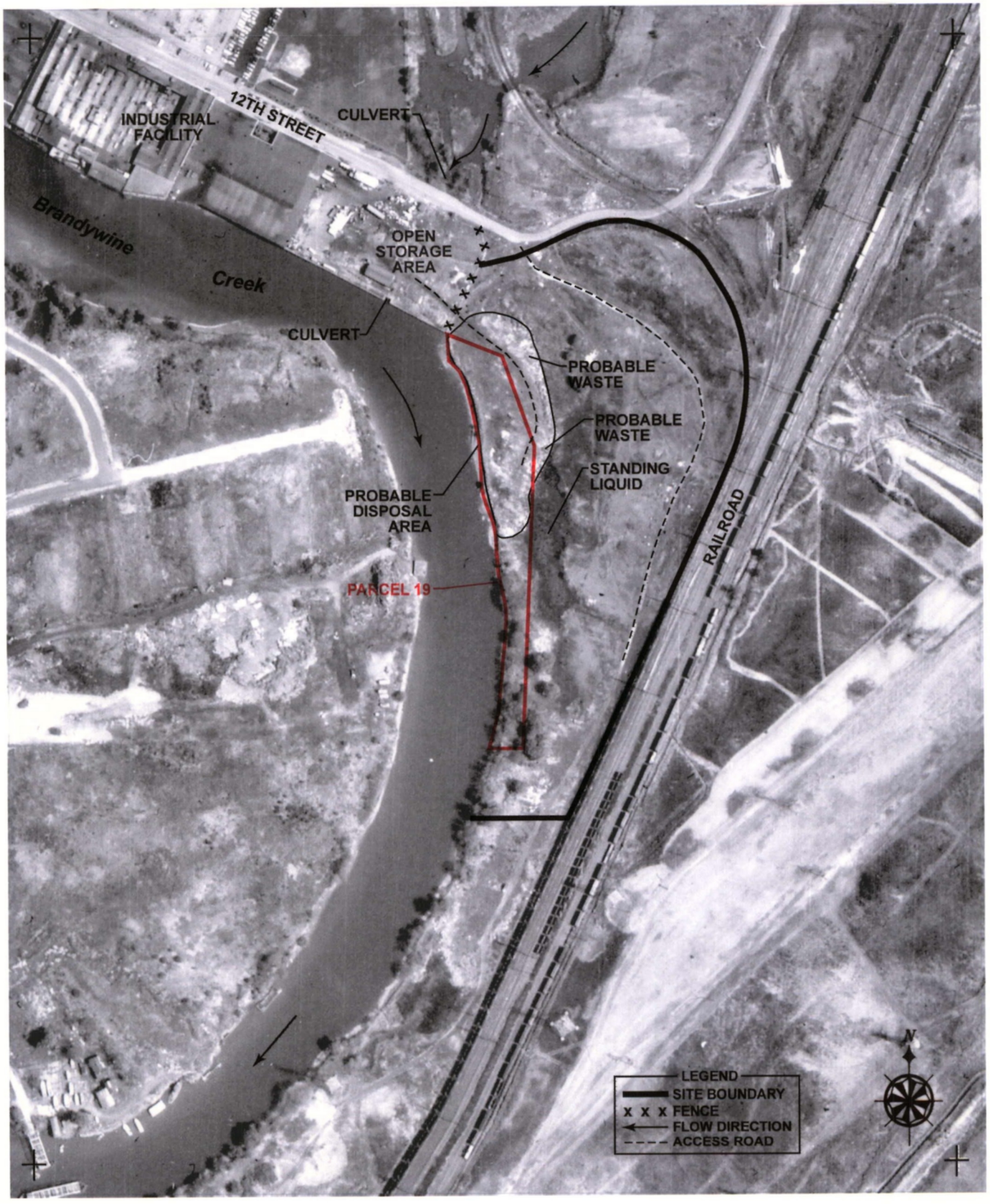

Figure 13. 12th Street Dump site, May 6, 1968. Approximate scale 1:4,300.

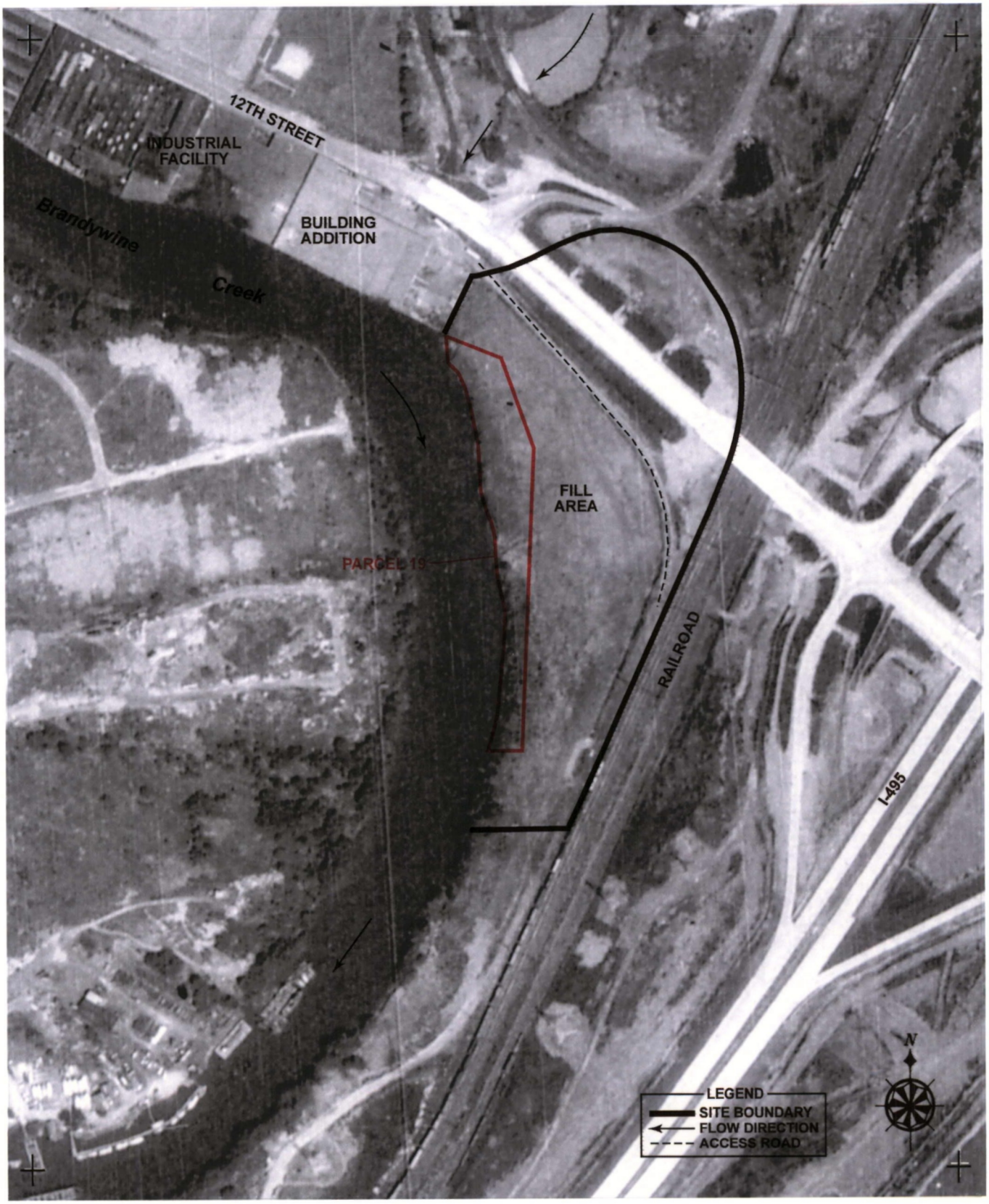

Figure 14. 12th Street Dump site, May 15, 1977. Approximate scale 1:4,300.

Figure 15. 12th Street Dump site, June 10, 1988. Approximate scale 1:4,300.

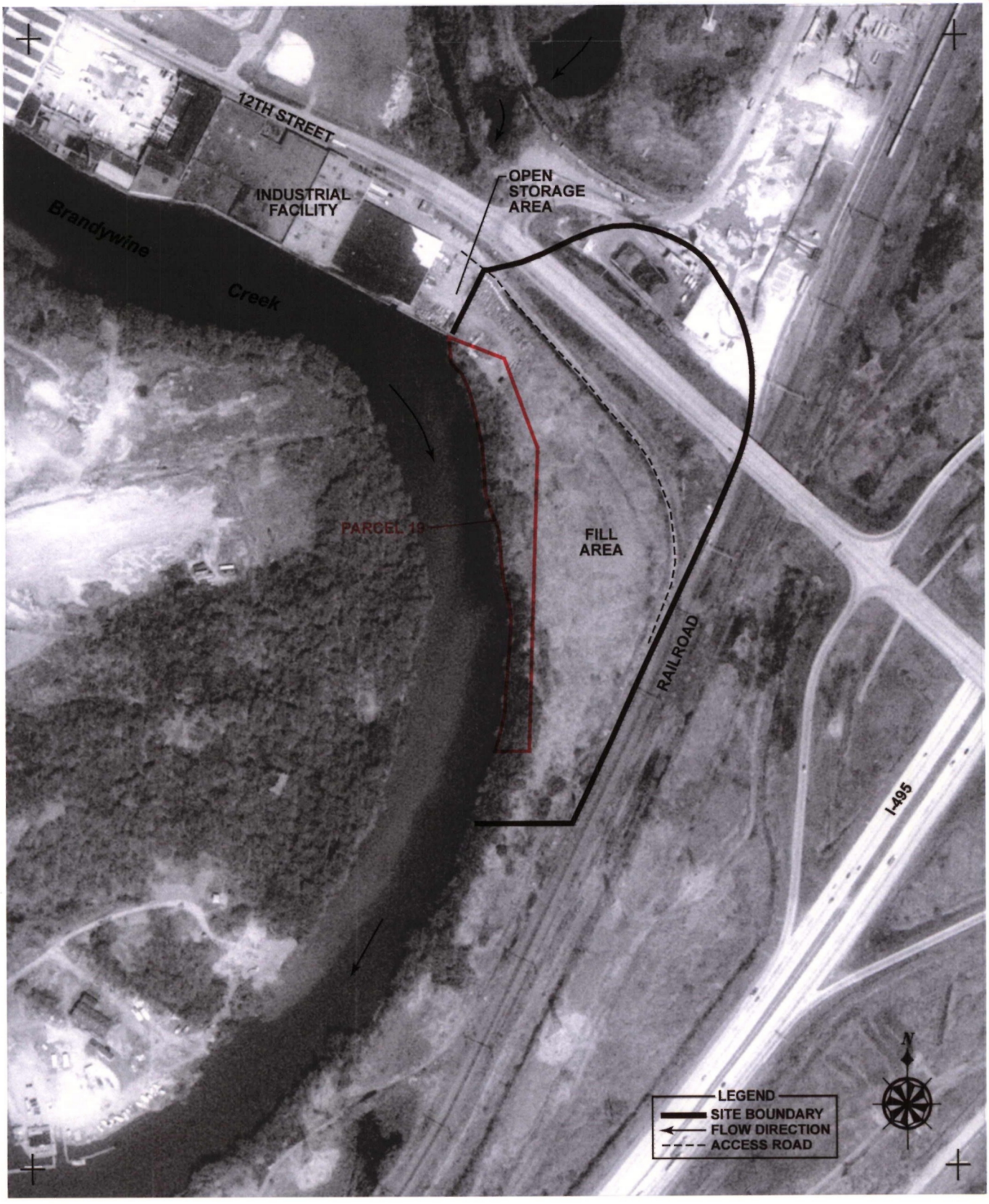

Figure 16. 12th Street Dump site, March 31, 1998. Approximate scale 1:4,300.

Figure 17. 12th Street Dump site, February 24, 2002. Approximate scale 1:4,300.

Historical Aerial Photo Analysis
12th Street Dump Study Area
Wilmington, Delaware

By

Larry Mata
Environmental Services
Lockheed Martin Services
Las Vegas, Nevada 89119

November 16, 2007

Contract No. EP-D-05-088

For

Work Assignment Manager
Michael Welsh, P.E.
Risk Management Program Coordinator
Oil and Prevention Branch
US Environmental Protection Agency
Philadelphia, PA 19103-2029

NOTICE

As an interim product, this document has not gone through the complete EPA quality assurance cycle. Any errors that are discovered during preparation of the final report will be corrected therein.

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11/20/07

INTRODUCTION

This report presents the findings from an analysis of historical aerial photographs of the 12th Street Dump SITE study AREA, located in New Castle County, Wilmington, Delaware. The study area analyzed in this report is bounded on the east by a railroad line, on the west by the Brandywine Creek, and throughout much of the study period by a railroad spur to the north (Figure 1). ~~This study area is contained within the 12th Street Dump site as the site is defined by the U.S. Environmental Protection Agency (see References page)~~. Historical aerial photographs covering the period from 1937 through 2002 were analyzed and reproduced for inclusion in the report. The dates of the sixteen historical aerial photographs presented in the report are 1937, 1942, 1944, 1946, 1950, 1954, 3/1959, 12/1959, 1962, 1964, 1965, 1968, 1977, 1988, 1998, and 2002 (see References section for details). This report was prepared in order to provide operational remote sensing support of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site investigations in U.S. Environmental Protection Agency (EPA) Region 3. Specifically, the research, acquisition, reproduction, and analysis of historical aerial photographs are needed in order to document landscape morphology, patterns of hazardous waste disposal, and other observable activities and conditions of environmental significance at the 12th Street Dump site, Wilmington, Delaware.

ANALYSIS

~~The findings~~ of the historical aerial photographic ~~analysis of the 12th Street Dump study area~~ presented in this report reveal that probable dredge spoil was ~~noted~~ LOCATED in the ~~southern area of the~~ study area along the bank of Brandywine Creek in 1942. In 1946 fill covered much of the northeast section of the study area. A disposal area began operating in the northwest section of the study area between 1946 and 1950. Evidence of continuing waste disposal activities on the area were noted on the 1954, 3/1959, 12/1959, 1962, and 1964 aerial photographs. Disposal activity appears to have ceased on the study area sometime between June 16, 1962 and April 1, 1964. During the years in which the disposal area was active, it appears that waste was placed along the ~~western~~ EASTERN edge of the disposal area and then pushed FURTHER eastward down an approximate 2 meter (7 feet) slope into the marshy lowland below. In this way the disposal area was expanded over time. During ~~its~~ THE active years the ~~top~~ REL HT OF THE surface of the disposal area approximated that of the open storage area associated with the industrial facility located northwest of the study area. No further evidence of waste disposal was visible on the study area for the remainder of the study period (June 16, 1962 through February 24, 2002). By 1977 a fill area covered the location of the disposal area. Historical aerial photographs from 1988, 1998, and 2002 reveal that ~~no environmentally significant changes were noted~~ on the study area after 1977. NO DISPOSAL ACTIVITY OCCURRED

Historical aerial photographs used in the analysis of this study area have been digitally scanned and printed for use in this report. A transparent overlay with interpretative data is affixed to each of the digital prints. In addition to the interpretative data, the boundary for the 12th Street Dump study area and the approximate boundary for Parcel 19 have been placed on the overlays. See the Methodology section for a discussion of the scanning and printing procedures. A Glossary section, defining features or conditions identified in this report, follows the Aerial Photographic Analysis section. Sources for all maps, aerial photographs, and collateral data used in the production of this report are listed in the References section.

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METHODOLOGY

This report was prepared using a standard methodology that includes the following steps:

- data identification and acquisition,
- photographic analysis and interpretation, and
- graphics and text preparation.

These steps are described below. Subsections also address details related to specific kinds of analyses that may be required to identify environmental features such as surface drainage and wetlands. All operational steps and processes used to perform this work (including data identification and acquisition, photographic analysis and interpretation, and graphics and text preparation) adhere to strict QA/QC guidelines and standard operating procedures (SOPs). These guidelines and procedures are documented in the Master Quality Assurance Project Plan (QAPP) prepared for Remote Sensing Support Services Contract No. EP-D-05-088 (LMS, 2005).

Data Identification and Acquisition

Data identification and acquisition included a search of government and commercial sources of historical aerial film for the study area. Photographs with optimal spatial and temporal resolution and image quality were identified for acquisition. In addition, U.S. Geological Survey (USGS) topographic maps were obtained to show the study area location and to provide geographic and topographic context.

Photographic Analysis and Interpretation

To conduct this analysis, the analyst examined diapositives (transparencies) of historical aerial photographs showing the study area. Diapositives are most often used for analysis instead of prints because the diapositives have superior photographic resolution. They show minute details of significant environmental features that may not be discernible on a paper print.

A photographic analyst uses a stereoscope to view adjacent, overlapping pairs of diapositives on a backlit light table. In most cases, the stereoscope is capable of various magnifications up to 60 power. Stereoscopic viewing involves using the principle of parallax (observing a feature from slightly different positions) to observe a three-dimensional representation of the area of interest. The stereoscope enhances the photo interpretation process by allowing the analyst to observe vertical as well as horizontal spatial relationships of natural and cultural features. The process of photographic analysis involves the visual examination and comparison of many components of the photographic image. These components include shadow, tone, color, texture, shape, size, pattern, and landscape context of individual elements of a photograph. The photo analyst identifies objects, features, and "signatures" associated with specific environmental conditions or events. The term "signature" refers to a combination of components or characteristics that indicate a specific object, condition, or pattern of environmental significance. The academic and professional training, photo interpretation experience gained through repetitive observations of similar features or activities, and deductive logic of the analyst as well as background information from collateral sources (e.g., study area maps, geologic reports, soil surveys) are critical factors employed in the photographic analysis.

Graphics and Text Preparation

The analyst records the results of the analysis by using a standard set of annotations and terminology to identify objects and features observed on the diapositives. Significant findings are annotated on overlays attached to the photographic or computer-reproduced prints in the report and discussed in the accompanying text. Annotations that are self-explanatory may not be discussed in the text. The annotations are defined in the legend that accompanies each print and in the text when first used. Objects and features are identified in the graphics and text according to the analyst's degree of confidence in the evidence. A distinction is made between certain and probable identifications. When the analyst believes the identification is unmistakable (certain), no qualifier is used. Probable is used when a limited number of discernible characteristics allow the analyst to be reasonably sure of a particular identification. The prints in this report have been reproduced, either by photographic or computer methods, from the original film. Reproductions are made from the original film and may be either contact (the same size) prints or enlargements, depending on the scale of the original film. Any computer-produced prints used in this report are generated from scans of the film at approximately 1,300 dots per inch (dpi) and printed at 720 dpi. Although the reproductions allow effective display of the interpretive annotations, they may have less photographic resolution than the original film. Therefore, some of the objects and features identified in the original image and described in the text may not be as clearly discernible on the prints in this report. Study area boundaries shown in this report were determined from aerial photographs or collateral data and do not necessarily denote legal property lines or ownership.

Some film vendors no longer supply analog film products (e.g., diapositive transparencies) to their customers. Digital files, created by scanning the original analog film products, are provided. The digital file, a representation of an original analog film product, can be analyzed either by computer viewing techniques or by creating a secondary diapositive from the digital file and viewing the secondary diapositive on a light table. The result of this process of converting an analog diapositive image to a digital file may be a reduction in the photographic resolution. A potential consequence of this in the realm of aerial photographic analysis is a lower confidence in the identification of features or conditions of environmental significance.

AERIAL PHOTOGRAPHIC ANALYSIS

October 16, 1937 (Figure 2)

The 12th Street Dump study area generally occupies the area between the railroad tracks located to the east and Brandywine Creek. The high ground on the study area parallels the bank of Brandywine Creek. The high ground slopes gently away from the ~~high ground~~ Brandywine Creek toward the low-lying, vegetated, marshy depression to the east. Much of the high ground is situated approximately 2 meters (7 feet) above the marshy depression. A network of dirt roads provides access onto the study area and the three buildings on it. The two northernmost access roads, which extend southward from 12th Street, cross a bridge over an unnamed tributary of Brandywine Creek before entering the study area. The bridge is shared by the railroad spur that forms the northern border of the study area.

An industrial facility, comprising one large building and numerous smaller buildings, is located northwest of the study area. The aforementioned railroad spur services the industrial facility.

November 8, 1942 (Figure 3)

The two buildings, located in the center of the study area in 1937, appear to have been removed. Access roads continue to lead onto the study area from the northwest via the bridge that crosses the unnamed tributary of Brandywine Creek. One of the roads leads to the building that is situated along the bank of Brandywine Creek. Probable dredge spoil has been placed along the bank of Brandywine Creek in the southern section of the study area.

Northwest of the study area a fill area has been placed along 12th Street near the unnamed tributary to Brandywine Creek. The fill area extends into the low marshy area to the north. Mounds of dark- and light-toned material (not annotated) have been placed on the surface of the fill area.

August 9, 1944 (Figure 4)

No significant environmental change is visible on study area. The two access roads have continued to be used in the northwest section of the study area.

The area east of the industrial facility is being used for the open storage of materials. Light-toned material and probable containers (not annotated) are housed in this storage area. A fill area has been placed along the bank of Brandywine Creek. Mounds of light-toned material (not annotated) have been placed along the fill face that extends toward the creek. The light-toned material on the eastern edge of the fill area is on fire. Smoke is visible rising from this area of open burning. The fill area in-place along 12th Street in 1942 has been expanded to the west. Mounds of light-toned material (not annotated) have been deposited atop this fill area.

March 12, 1946 (Figure 5)

CAPITALIZE STUDY AREA ORIGINAL DOCT THROUGHOUT

Fill material has been spread in a graded layer across much of the low-lying, marshy depression in the northeast section of the ~~12th Street Dump~~ S A study area. Striations, indicative of the operation of heavy machinery, are visible across the surface of the fill area. A remnant of the low-lying, vegetated, marshy depression (not annotated) remains between the high ground along the bank of Brandywine Creek and the fill area. Two drainage ditches have been constructed on the fill area. The drainage ditches carry flow to the west into the marshy depression. The road located east of the industrial facility continues to be used to access the building in the northwest section of the study area.

The area east of the industrial facility continues to be used for the open storage of materials. Light-toned material and containers (not annotated) are housed in this storage area. The fill area located along the bank of Brandywine Creek has been expanded. Mounds of light-toned material (not annotated) have been placed along the fill face that extends toward the creek. The fill area in-place along 12th Street in 1942 has been expanded eastward and northward. Mounds of dark- and light-toned material (not annotated) have been deposited atop this fill area.

April 7, 1950 (Figure 6)

Between 1946 and 1950 a disposal area began operating in the northwest section of the study area. A dirt road, leading from 12th Street and the nearby industrial facility, affords access to the disposal area. A long sinuous mound of waste, comprising various shaped and sized small mounds of light-toned and dark-toned waste, has been placed along the west side of the disposal area. The ~~west~~ EAST side of the mounded waste defines the active face of the disposal area. The edge of the active face is situated approximately 2 meters (7 feet) above the marshy area that lies to the east. Drainage from ~~the west~~ THE AREA OF THE HIGHGROUND TO THE EAST side of the disposal area and also areas east of the disposal area appear to collect in an area of standing liquid southeast of the disposal area. The remainder of the study area is inactive.

INDICATING THAT APPROX 1' OF WASTE HAS BEEN ADDED TO THE EAST ? QUANTIFY

A building addition has been constructed on the east side of the industrial facility where an open storage area and fill area were noted in1944 and 1946. The fill area noted in 1942, 1944, and 1950 along 12th Street has continued to be expanded eastward and northward. Mounded material (not annotated) is visible on the surface of the fill area.

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August 14, 1954 (Figure 7)

The northwest corner of the ~~12th Street Dump~~ S study area A has continued to be used as a disposal area. The two access roads that lead directly onto the disposal area emanate from the industrial facility. ~~There does appear to be~~ R/O ~~indirect access onto the disposal area from 12th Street~~. Another access road leads from the industrial facility into the northern section of the study area. The disposal area has been expanded into the marshy lowland to the east. Mounded waste, composed of variously shaped and sized mounds of light- and dark-toned waste and debris, has continued to be placed along the eastern active face of the disposal area. It appears that expansion of the disposal area is achieved by placing waste along the eastern edge of the disposal area and then pushing the waste into the marshy lowland area to the east. The height of the surface of the disposal area, including the newly expanded portion, has remained relatively the same since 1950. Scattered mounds of waste (not annotated) have been placed about the surface of the remainder of the disposal area.

Much of the area east of the industrial facility has been filled and graded. The fill area near the northwest corner of the study area has covered over the unnamed tributary of Brandywine Creek. It appears that the tributary has been channelized under the fill area. Two culverts likely indicate the location of the channel. 12th Street has been extended eastward, its terminus is near the northern boundary of the study area.

March 5, 1959 (Figure 8)

The northwest corner of the 12th Street Dump study area continues to be used as a disposal area. The disposal area continues to be expanded into the marshy lowland to the east. Mounded waste has continued to be placed along the eastern active face of the disposal area. The waste, composed of variously shaped and sized mounds of light-toned and dark-toned waste and debris, is situated approximately 2 meters (7 feet) above the marshy area located to the east. Scattered mounds of waste (not annotated) have been placed at various locations about the top of the remainder of the disposal area. However, the height of the surface of most of the disposal area has not changed since 1954. A fence has been built along the northwest boundary of the study area and the industrial area. An access road links the industrial facility to the area atop the disposal area via an opening in the fence. This road now appears to provide the only access to and from the disposal area. Another road enters the study area near the eastern terminus of 12th Street. This road provides access to the northeastern section of the study area from 12th Street. Probable debris (not annotated) has been scattered in the area south of the railroad spur.

The area between the northwest study area boundary and the buildings of industrial facility is being used for open storage. Mounds of light-toned material, tanks, and containers are housed in the area. The aforementioned fence runs along the eastern edge of the open storage area.

December 4, 1959 (Figure 9)

The spatial resolution of the December 4, 1959 photographs is lower than other photographic coverages used in this report. Therefore, features and conditions visible on photographs from other coverages may not necessarily be discernable on the December 4, 1959 photographs and the following analysis is not as detailed.

The only identifiable features of environmental significance on the study area are the light-toned mounded material and the standing liquid. The light-toned mounded material is located where positively identified mounded waste is noted on the March 1959 and the 1962 photographic coverages. The March 1959 coverage and the 1962 coverage chronologically bracket the December 4, 1959 photograph. As depicted on the December 4, 1959 the south end of the light-toned material is on fire. Smoke is visible rising from this open burning area.

The industrial facility remains in operations northwest of the study area.

June 16, 1962 (Figure 10)

Waste disposal operations have continued on the study area. Mounded waste has continued to be placed along the active face of the disposal area. The disposal area has been expanded to the east and also to the south into the marshy lowlands. The waste is composed of variously shaped and sized mounds of light-toned and dark-toned waste, and debris. Scattered mounds of waste (not annotated) have been placed at various locations about the top remainder of the disposal area. The relative height of the disposal area remains the same. As in March 1959 an access road leads from the open storage area of the industrial facility onto the disposal area. This road again provides the only discernable access to and from the disposal area. An access road continues to lead through the northeast section of the study area. Much of the probable debris, noted in March 1959 on the surface of the northernmost section of the study area, remains visible. New probable debris appears to have been added to the area.

The area between the northwest study area boundary and the buildings of industrial facility continue to be used for the open storage of light-toned material, tanks, and containers.

April 4, 1964 (Figure 11)

The areal extent of the disposal area does not appear to have changed since 1962. However, the disposal area was active between 1962 and 1964 as indicated by the waste that has been added to mounded waste in the northeast section of the disposal area and also by the light-toned mounds of waste (not annotated) that have been placed in the center of the disposal area. The only discernable access onto the disposal area continues to be the road that leads onto the area from the industrial facility. As in 1962 the road passes through an opening in the fence situated along the eastern edge of the industrial facility's open storage area. At this time the opening in the fence is gated, restricting egress from the industrial facility onto the disposal area. A dark-toned plume is visible in the standing liquid adjacent to the southeast portion of the disposal area. The plume likely indicates liquid leakage from the face of the disposal area into the area of standing liquid. Probable debris has been scattered across the surface of the northernmost section of the study area. A road continues to provide access into the area from the eastern terminus of 12th Street.

A large number of containers (not annotated) are stored in neatly stacked rows in the open storage area on the industrial facility located west of the study area.

April 4, 1965 (Figure 12)

The disposal area located in the northwest corner of the study area appears to have been inactive over the last year (April 4, 1964 through April 4, 1965). The areal extent and height of the disposal area does not appear to have changed. The access road that leads onto the disposal area does not appear to have changed since 1964. The dark-toned plume, however, remains visible in the standing liquid adjacent to the southeast portion of the disposal area. This indicates that liquid leakage continues from the face of the disposal area. Much of probable debris, noted in 1964 on the surface of the northernmost section of the study area, remains visible. New probable debris appears to have been added to the area. The access road noted in 1964 continues to provide access into the area. A fill area has been placed in the low-lying, marshy depression in the southern section of the study area.

The open storage area on the industrial facility located west of the study area houses light- and dark-toned material, and tanks. The containers noted in the open storage area in 1964 have been removed.

May 6, 1968 (Figure 13)

No new waste material appears to have been added to the probable disposal area located in the northwest corner of the 12th Street Dump study area. The mounds of waste visible on the surface of the center of the area in 1964 and 1965 have been removed. The scattered probable debris noted in the northeast section of the study area in 1964 and 1965 is no longer visible.

The open storage area on the industrial facility located west of the study area houses light- and dark-toned material, containers, and tanks. The gate on the fence located on the eastern edge of the open storage is visible. This gate restricts traffic flow between the industrial facility and the probable disposal area.

- MONOSCOPIC COVERAGE (NOT STEREO) - 1 PHOTO AVAILABLE

ADD LANGUAGE THAT PROB DISP AREA IS CONS. W/ MOUNDED AREAS (1ST PARA)

May 15, 1977 (Figure 14)

The disposal area on the 12th Street Dump study area is no longer visible. A fill area has been placed atop this location and most of the remainder of the study area. The fill area forms one large oblong-shaped mound and its surface is vegetated. A road has been constructed that provides access to the industrial facility northwest of the study area. In the northeast corner of the study area 12th Street has been extended eastward to intersect with Interstate 495.

A building addition has been constructed on the industrial facility. The building addition is on the location of the former open storage area.

June 10, 1988 (Figure 15)

There is no visual evidence that disposal activity has occurred on the study area since 1977. The fill area that covers most of the study area remains relatively unchanged. All but the center section of the study area is covered in brush and trees.

March 31, 1998 (Figure 16)

There is no visual evidence that disposal activity has occurred on the study area since 1988. The fill area that covers most of the study area remains relatively unchanged. A sand and gravel facility is now operating on the study area north of 12th Street. An open yard (not annotated) associated with the industrial facility has been built in the study area on its northwest boundary. The yard is being used as an open storage area.

February 24, 2002 (Figure 17)

There is no visual evidence that disposal activity has occurred on the study area since 1998. Riprap and a lagoon are now visible along the bank of Brandywine Creek. Trees and brush have been cleared off of the northwest section of the fill area. The open yard in the northwest section of the study area no longer appears to be used as an open storage area.

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GLOSSARY

Access Road - A paved or unpaved route of vehicular access.

Building - A relatively permanent, essentially boxlike construction having a roof.

Container - Any portable device in which material is stored, transported, handled, or disposed.

Dark- , Medium- , or Light-Toned - Tones of features in question are compared with the darkest and lightest tones of gray (if using B&W photography) on the print.

Debris - The remains of anything that can be identified as being broken down, destroyed, demolished, or dismantled.

Face - The wall or slope of a mine, extraction, excavation, landfill, or fill area at which work is progressing (e.g., working face, fill face).

Fence - Man-made obstructive structure which regulates access in or out of a site, area, etc.

Fill - Earth, stones, or other material that is used to build up the level of an area of ground.

Fill Area - An area where material is being deposited to fill a depression; or area where materials have been added, altering the elevation of the ground surface.

Mounded Material - Piles of raw or waste materials on or in the vicinity of the study area.

Open Storage Area - An area of open-air (outdoor) storage of containerized, raw or waste materials, within industrial or manufacturing sites.

Outfall - Discharge point of a waste stream into a body of water or the air.

Riprap - (also known as rip rap, rubble, revetment, shot rock or rock armour) Rock or other material used to armor shorelines against water erosion

Plume - The detectable emission from an outfall or smokestack.

Standing Liquid - A small, shallow, temporary collection of liquid, not necessarily waste. Not to include liquid contained in impoundments, trenches, pits, etc.

REFERENCES

MAPS:

•U.S. Geological Survey Map, dated 1993. Scale: 1:24,000. Referenced in report as Figure 1.

•New Castle County, Delaware Property Map #45. Approximate Parcel 19 boundary depicted on Figures 2 through 16.

~~•U.S. Environmental Protection Agency SITE BOUNDARY CITATION~~ TAKE OUT

AERIAL PHOTOGRAPHS:

•10/16/37 photographs obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah. Source frame # 60. Original Scale: 1:20,000. Referenced in report as Figure 2.

•11/08/42 source unknown. Source frame # 17. Original Scale: 1:20,000. Referenced in report as Figure 3.

•08/09/44 photograph obtained from National Ocean Service, Coast and Geodetic Survey, Washington, D.C. Source frame # 2776. Original Scale: 1:20,000. Referenced in report as Figure 4.

•03/12/46 photograph obtained from National Ocean Service, Coast and Geodetic Survey, Washington, D.C. Source frame # 220. Original Scale: 1:16,000. Referenced in report as Figure 5.

•04/07/50 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Source frame # 157. Original Scale: 1:24,000. Referenced in report as Figure 6.

•08/14/54 photograph obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah. Source frame # 209. Original Scale: 1:20,000. Referenced in report as Figure 7.

•03/05/59 photograph obtained from Aerial Viewpoint, Inc., Spring, Texas. Source frame # 352. Original Scale: 1:24,000. Referenced in report as Figure 8.

•12/04/59 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Source frame # 2606. Original Scale: 1:60,000. Referenced in report as Figure 9.

•06/16/62 photograph obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah. Source frame # 124. Original Scale: 1:20,000. Referenced in report as Figure 10.

•04/04/64 source unknown. Source frame # 939. Original Scale: 1:20 ,000. Referenced in report as Figure 11.

•04/04/65 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Source frame # 246. Original Scale: 1:24,000. Referenced in report as Figure 12.

•05/06/68 photograph obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah. Source frame # 48 Original Scale: 1:20,000. Referenced in report as Figure 13.

•05/15/77 photograph obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah. Source frame # 146. Original Scale: 1:40,000. Referenced in report as Figure 14.

•06/10/1988 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Original Scale: 1:40,000. Referenced in report as Figure 15.

•03/31/1998 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Original Scale: 1:40,000. Referenced in report as Figure 16.

•02/24/2002 photograph obtained from U.S. Department of Interior, U.S. Geological Survey, Washington, D.C. Original Scale: 1:19,200. Referenced in report as Figure 17.

OTHER MATERIALS:

LMS (Lockheed Martin Services). 2005. Master Quality Assurance Project Plan. Prepared for EPA Environmental Sciences Division. Contract EP-D-05-088. Las Vegas, Nevada.